

EXHIBIT D
to Declaration of Steve Loe

Steve Loe Sur-Rebuttal Summary of Testimony

State Water Resources Control Board, Division of Water Rights
Enforcement Branch v. BlueTriton Brands, Inc. (INV 8217)

BTB Has Altered Hydrologic Conditions in Strawberry Canyon

“The monthly monitoring maps show hydrologic conditions similar to those described by Mr. Rowe for the period from August 1930 to April 1931.” –Nichols (BTB-7 (paragraph 122))

Opinion: The Flow in Strawberry Creek is Much Diminished from Pre-Diversion Conditions, evidenced by changes in measured flow, changes in the extent of riparian landscape, BTB’s flow measurements compared to historic measurements, reports of the US Forest Service, and the statements of Dames & Moore.

Pre-Diversion, Strawberry Creek was fed by a strong flow from the headwater springs

- *"I have made no mention of the question of the origin of the springs and their source of water supply, because we can assume that they have been flowing for a great many years and the water has been entering Strawberry Creek."*
–W.P. Rowe (July 12, 1930) (SOS 055_028)
- *"Strawberry Creek drains a portion of the south slope of the San Bernardino Mountains. It has its source at a group of springs which issue from the side of Strawberry peak. . . . The flow from these springs being deep seated should be fairly regular, especially during the late summer season. The observations show this to be the case. The dependable supply will aggregate about 10 inches of which 8 inches are at present diverted from spring #2 into the pipe line leading to the Arrowhead hotel and vicinity. The water not so diverted flows down the side hill to a common junction at a narrow bed rock gully lined with alder, sycamore, dogwood and cedar trees together with ferns and thimble berry bushes. The junction of flow from all of the upper springs at the head of Strawberry Creek is at station 123 + 00, or 12,300 feet upstream from the old intake . . . to Arrowhead Hotel which was laid in 1929. About a quarter of a mile downstream from this junction point, the stream enters a little valley caused by faulting along the side of the San Bernardino Mountains. At this valley or Cienega the flow is augmented by more springs [10, 11, 12]. From the lower end of the Cienega at station 84+00 to the first bed rock crossing Strawberry creek on the surface, which is at station 61+00, the stream flows in a typical gravel and boulder covered canyon bottom lined with alder, sycamore and bay trees."*
–W.P. Rowe (May 15, 1931) (SOS 051_001-002)

Precipitation 1930

- 1929 through 1934, before and while Rowe was observing the Headwaters Springs, were dry years.
- Very low flow shown at East Twin Creek for 1928-1932.

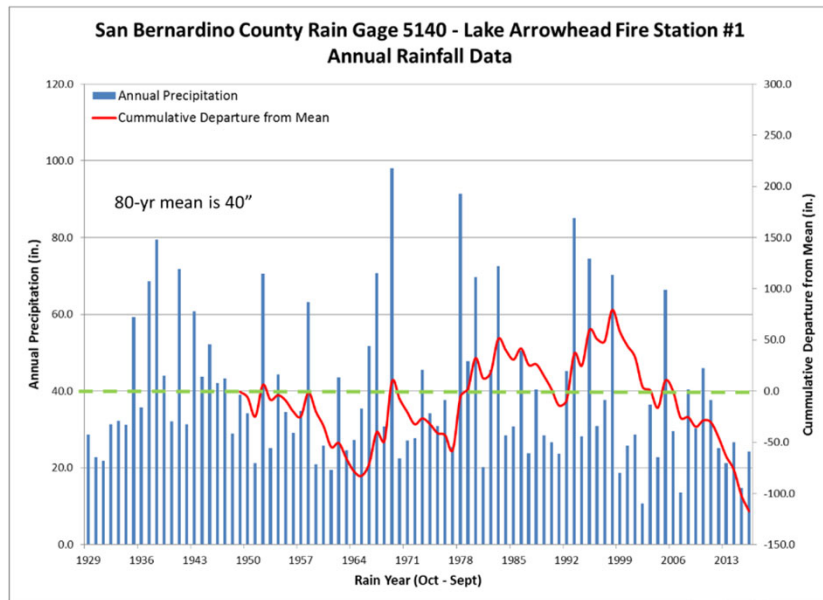
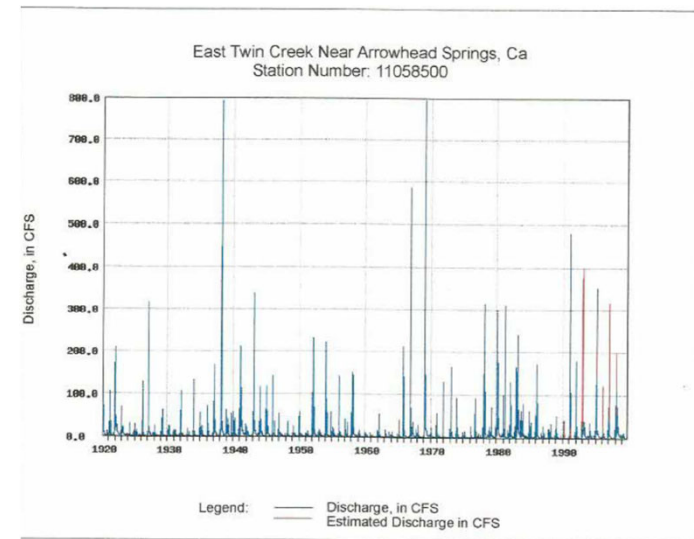


Figure 08. Rainfall hydrograph for San Bernardino County Rain Gage 5140 showing total annual precipitation from 1929 to 2016. Cumulative departure from the 80-yr mean (40 in.) starting from 1949 (first closest year to mean precipitation).

SOS 026_11
Bearmar 2017 Geotechnical Report

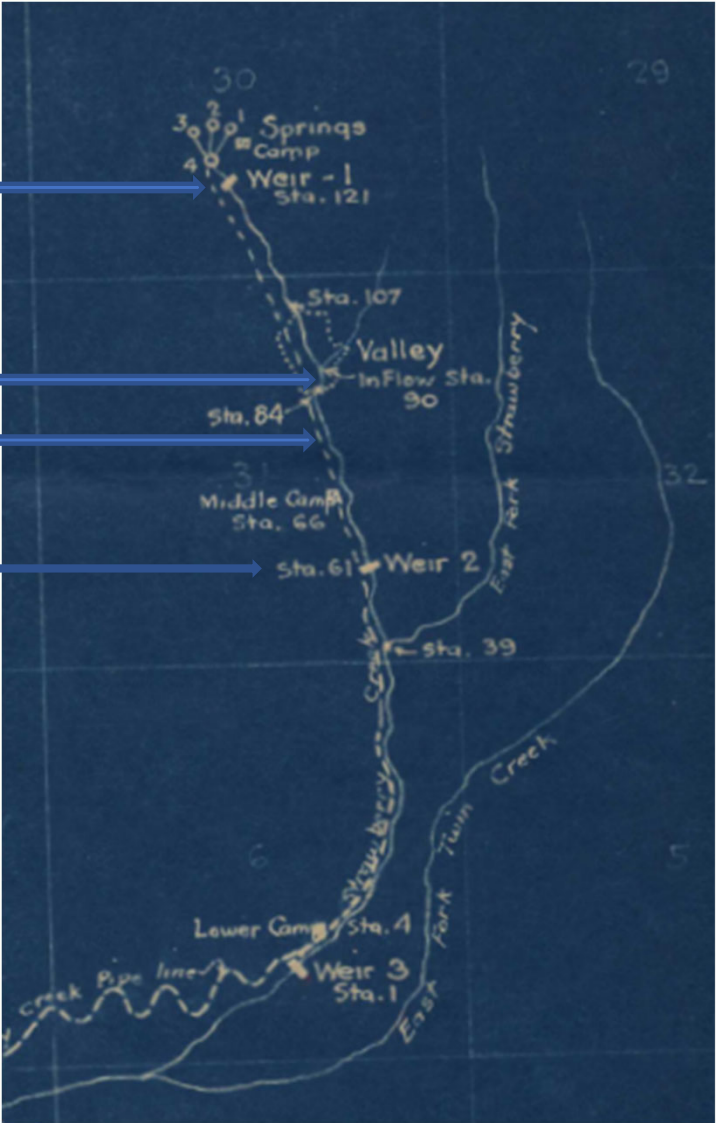
“During the winter of 1930-31, there were very few rains of sufficient quantity to produce any flash runoff. Because of these comparatively light rains and the absence of snow storage, the season was an ideal one for study”—Rowe (SOS 051_002)



SOS 017_074
Dames & Moore 2002

Rowe
Map/Haley
Aldrich Flow
Monitoring
Locations

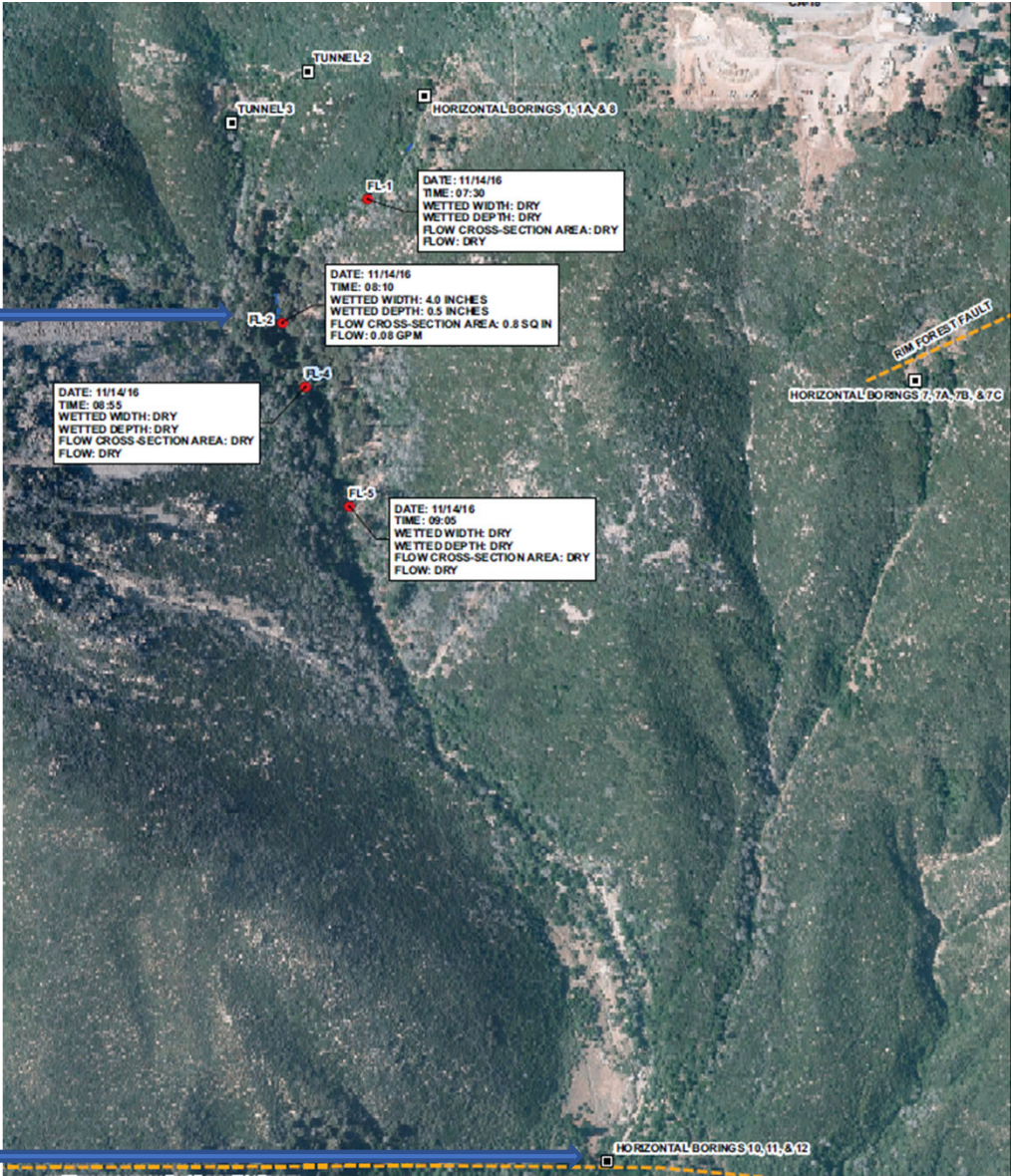
- FL-2
- Cienega Inflow
- TR-BF-50
- TR-BF-XS-43



SOS 049

Haley
Aldrich
Map/Rowe
Flow
Monitoring
Locations

Rowe Weir 1



Cienega

Haley & Aldrich
BTB-7_540

September 2016 v. August 1930

BTB Location	September 2016 Flow (GPM)	1930 Flow (GPM)	Rowe Location
Spring 1 (Horizontal Borings 1, 1A, 8)	0	11 (July 3, 1930)	Spring 1
Spring 2 (Tunnel 2)	0	59 (July 3, 1930)	Spring 2
Spring 3 (Tunnel 3)	0	19 (July 3, 1930)	Spring 3
Spring 4 (GR-1)	2	67 (July 3, 1930)	Spring 4
FL-2	0.08	170 (July 3, 1930)	Weir 1/Stn. 121
		46.8 (Dec. 15, 1930)	Flow above Stn. 90
	0	17.1 (Dec. 15, 1930)	Cienega (inflow at—not part of main channel)
Spring 10, 11, 12 (TR-BF-50/)	0	63 (Dec. 15, 1930)	Cienega (flow below)/Stn. 84
TR-BF-XS-49	6.6		
TR-BF-XS-43	3.2		
			Weir 2/Stn. 61

Sources: BTB-7_214-215, SOS 040, SOS 044, SOS 048

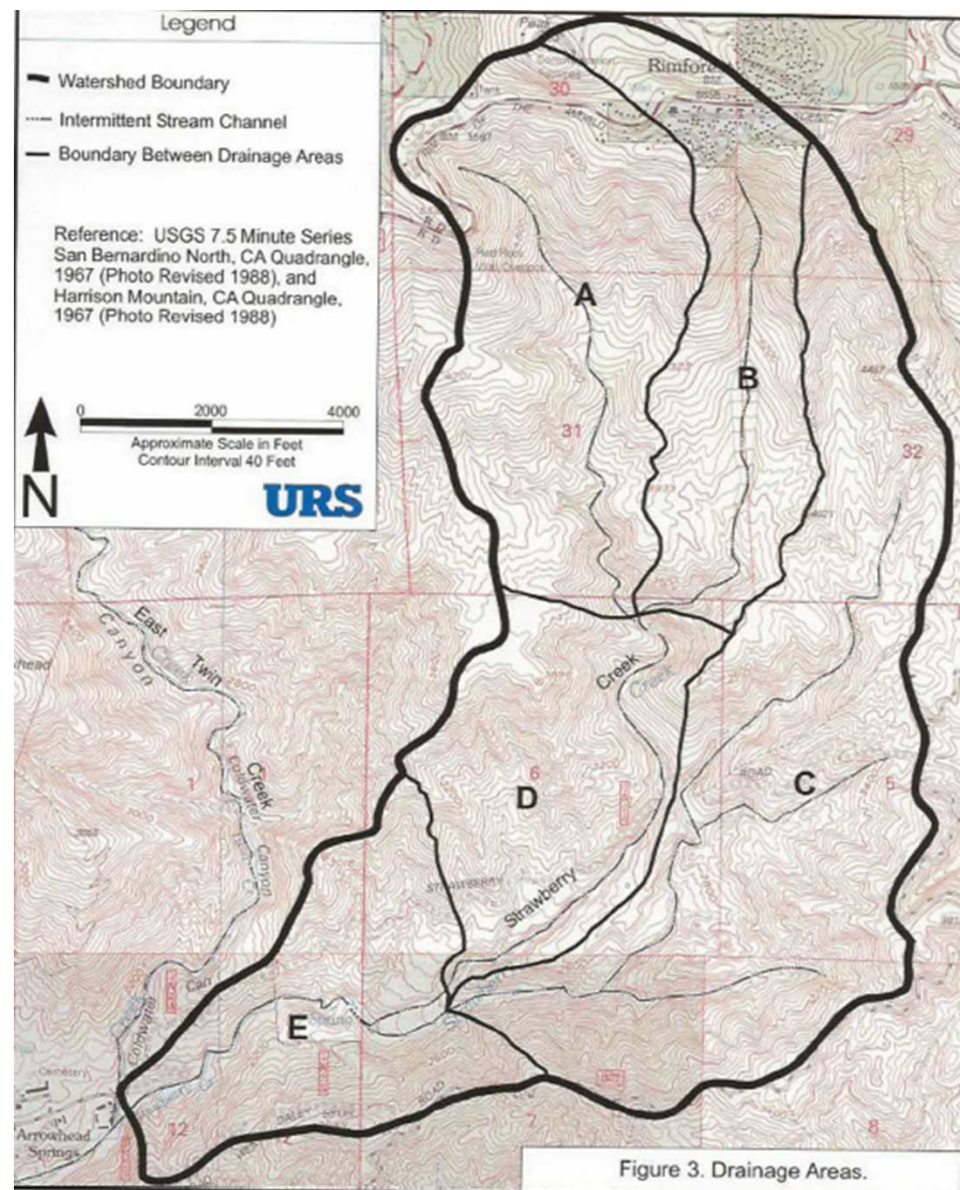
Modern Observations

- My Observations: The entire area above Weir 1 at the confluence of the Upper Springs is basically dry in normal or below normal years.
- BTB's Own Reporting of long stretches of dewatered creek where Rowe reported flow (see table on slide 7)
- The Forest Service has demanded more flow to replicate natural conditions (SOS 007_008)

Modern Observations 2: Dames & Moore

- Dames & Moore: “Based on the historical information concerning Arrowhead Springs, there is no indication that these springs have ever stopped flowing, even during drought conditions, **except when the flows are diverted by the associated bore holes.** Thus these springs are classified as perennial springs.” (SOS 016_60 (bold added) (1999))
- Dames & Moore: “if spring water were not harvested in Area A, the surface water flow in the stream channel below Station 1 would be expected to increase, with the average base flows over most of the central watershed Reaches increasing by approximately 20 gpm. For most of the stream Reaches in Areas A,D, and E, the additional flow would widen and deepen the surface water flow. Additionally, if spring water were not harvested, it has conservatively been assumed that surface water flow would occur in stream Reaches 2, 5, and 6, located below the Arrowhead Springs.” (SOS 017_25.)

SOS 017_073



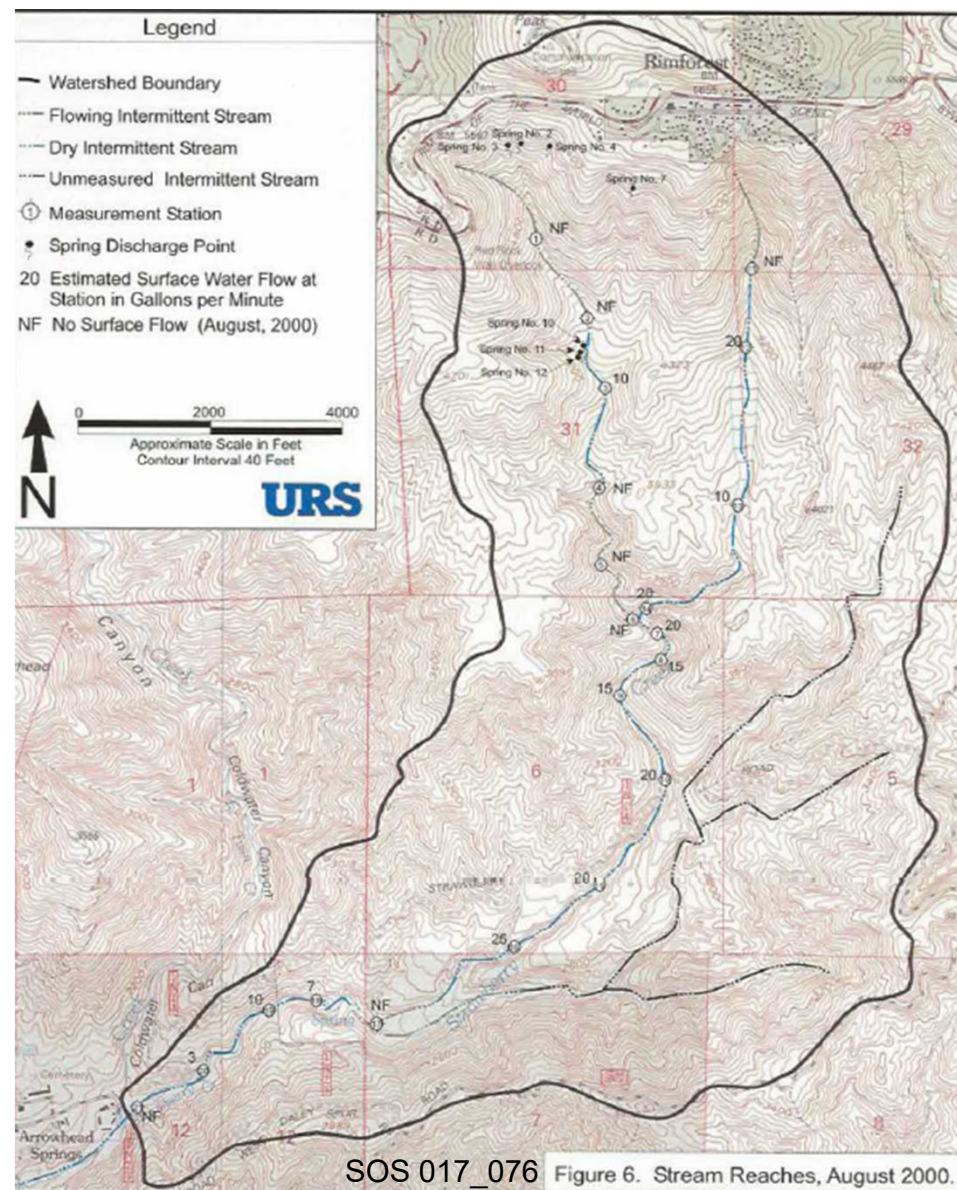
Modern Observations 3: Dames & Moore

Table 3. Current and Estimated Surface Water Flows

Reach No.	Current Flow ^a (gpm)	Estimated Flow ^b (gpm)	Remarks
1	0	0	This Reach is very high in the watershed, and based on conditions in Area B, surface water base flow is not anticipated in this Reach even without spring water harvesting.
2	0	10	Based on the location and elevation of the Reach, and comparison with Area B, some surface water base flow is expected for this Reach if no spring water were harvested. It is estimated that the flow at the beginning of the reach would still be zero, but that the flow at the bottom would be increased by about 20 gpm. Therefore, the average flow expected is 10 gpm.
3	5	15	This Reach is estimated to have an increase in base flow of 20 gpm.
4	10	30	This Reach is estimated to have an increase in base flow of 20 gpm.
5	0	20	This Reach is estimated to have an increase in base flow of 20 gpm.
6	0	20	This Reach is estimated to have an increase in base flow of 20 gpm.
7	20	40	This Reach is estimated to have an increase in base flow of 20 gpm.
8	15	35	This Reach is estimated to have an increase in base flow of 20 gpm.
9	15	35	This Reach is estimated to have an increase in base flow of 20 gpm.
10	20	40	This Reach is estimated to have an increase in base flow of 20 gpm.
11	0	0	This Reach is in Area B, and is not affected by spring water harvesting in Area A.
12	10	10	This Reach is in Area B, and is not affected by spring water harvesting in Area A.
13	20	20	This Reach is in Area B, and is not affected by spring water harvesting in Area A.
14	20	20	This Reach is in Area B, and is not affected by spring water harvesting in Area A.
15	20	40	This Reach is estimated to have an increase in base flow of 20 gpm.
16	25	45	This Reach is estimated to have an increase in base flow of 20 gpm.
17	12.5	22.5	This Reach is estimated to have an increase in base flow of 10 gpm.
18	3.5	5.0	The average base flow in this Reach is considered to increase proportionally to the increase in average underflow from Areas C and D if no spring water were harvested.
19	8.5	12.2	The average base flow in this Reach is considered to increase proportionally to the increase in average underflow from Areas C and D if no spring water were harvested.
20	6.5	9.4	The average base flow in this Reach is considered to increase proportionally to the increase in average underflow from Areas C and D if no spring water were harvested.
21	1.5	2.2	The average base flow in this Reach is considered to increase proportionally to the increase in average underflow from Areas C and D if no spring water were harvested.

Notes: a = Surface water flow based on field assessment in August-September 2000 with spring water harvesting.
b = Estimated average surface water flow rate if no spring water were being harvested.

SOS 017_020



SOS 017_076 Figure 6. Stream Reaches, August 2000.

Forest Service Has Rated Each of the Springs Poor Due to Water Quantity/Altered Hydrograph

Spring Number	Quote	Page
2	<p>“The Existing Condition does not operate Tunnel 2 to partially mimic the natural hydrograph associated with this spring location, so the current rating is Poor (Impaired).”</p> <p>“As Tunnel 2 extraction prevents continued aquatic habitat from being supported on the surface, the Existing Condition has a Poor rating.”</p>	SOS 027_33 (USFS/Taylor, 2017)
3	<p>“The Existing Condition does not operate Tunnel 3 to partially mimic the natural hydrograph associated with this spring location, so the current rating is Poor (Impaired).”</p> <p>“The Existing Condition at Tunnel 3 has dewatered the channel and made it intermittent at best, reducing the diversity of native riparian vegetation compared to the potential in a perennial system. As the information provided by the permittee indicates that Tunnel 3 always produces some water, the natural condition would be locally perennial. The existing rating is Poor (Impaired).”</p>	34
1, 1A, 8	<p>“The Existing Condition does not operate Boreholes 1, 1A, and 8 to partially mimic the natural hydrograph associated with these groundwater locations, so the current rating is Poor (Impaired).”</p> <p>“The Existing Condition at Boreholes 1, 1A, and 8 has dewatered the channel and made it ephemeral until further downgradient where other springs feed the channel, reducing the diversity of native riparian vegetation compared to the potential in a perennial system. As the information provided by the permittee indicates that Boreholes 1, 1A, and 8 always produces some water, the natural condition would be locally perennial. The existing rating is Poor (Impaired).”</p>	35-36
7, 7A, 7B, 7C	<p>“The Existing Condition does not operate Boreholes 7, 7A, 7B, and 7C to partially mimic the natural hydrograph associated with these groundwater locations, so the current rating is Poor (Impaired).”</p> <p>“The Existing Condition at Boreholes 7, 7A, 7B, and 7C has dewatered the channel and made it ephemeral downgradient (about ¾ mile) until the influence of the Waterman Canyon fault makes the channel intermittent. This water extraction reduces the diversity of native riparian vegetation.”</p>	36-37
10, 11, 12	<p>“The Existing Condition does not operate Boreholes 10, 11, and 12 to partially mimic the natural hydrograph associated with these groundwater locations, so the current rating is Poor (Impaired).”</p> <p>“Boreholes 10, 11, and 12 were developed to capture water backed up by the Waterman Fault that had been expressing from a sediment wedge that has been described as a meadow habitat.”</p> <p>“The Existing Condition at Boreholes 10, 11, and 12 has partially dewatered the channel and made it intermittent from downgradient of the Waterman fault to the confluence with the main channel of Strawberry Creek. As the information provided by the permittee indicates that Boreholes 10, 11, and 12 always produces some water, the natural condition would be locally perennial.”</p>	37

Prior to diversion there was more riparian vegetation, indicating a change in hydrology

- At Camp 2 there were alders covering about 75 foot wide on July 3, 1930 (SOS 040_007)
- Below weir #1 at 4,665 feet the creek was lined with alder fern and willow (SOS 040_006)
- Between Weir #1 at station 121 and station 86, just below 10, 11, 12 Rowe observed “heavy alder growth” (SOS 055_51)
- From the lower end of the Cienega to station 61 is lined with alder, sycamore and bay (SOS 051_001-002)
- Rowe focused on evapotranspiration in his study, so it must have been a “problem” on a scale difficult to imagine today (SOS 042, 054, 055)

Development of Spring #2 Dramatically Altered Hydrology

- First Spring developed by BTB predecessors
- Mr. Rowe speculated that diversion would cause the stream below Spring #2 to go dry: “it is probable that the stream will go dry above weir #2 during the coming summer as spring #2 will be diverted continuously.” (SOS 051_003, bottom of first full paragraph.)
- Stream flow at the confluence of 1, 2, 3, 4 was 170 gpm on July 3, 1930 (SOS 040_006 prior to diversion and dropped to 20 gpm in October 1930 after development of Spring 2 (SOS 044_001)
- Spring 4, the “Big Spring” before development, almost went dry after #2 developed: flows at 4 on July 3, 1930 were 67 gpm (SOS 040_005) and dropped to a trace after (SOS 044_1, 2, 3, SOS 040_005)
- Rowe called the camp at the top of the mountain near 1, 2, 3, 4 the “Springs Camp” prior to development (SOS 049)

There is clear evidence of the location of the original springs

““There is no clear evidence indicating where spring orifices may have been located in proximity to the tunnels and boreholes at the time they were originally developed. –Nichols (BTB-7 (paragraph 130)

Opinion: It is possible to discern the location of the original springs with sufficient clarity to determine that the diverted water would have flowed into to Strawberry Creek.

FS/Highway Spring

- “The so-called ‘Highway Spring’ is northerly and easterly of Spring No. 1.” (SOS 057_002)
- Rowe felt that Springs 1, 2, 3, and the highway diversion all originated from the same fault line (SOS 057_002)
- Forest Service Geo-Sciences Specialist Report by Michelle Bearmar identifies Spring 4 diversion as a cause in changed flow to this Spring (SOS 026_026)



Springs 1, 1a, 8

- Spring 1 not added to the collection system until after 1948 , and, when it was flowing naturally on April 13, 1948, the discharge was 10.5 gallons per minute. SOS 57_006 (Rowe 1948)
- Spring 8 added around 1948/1950 (FR 153_5 (ETW, 1976); SOS 277_028)



Spring 2

- The location of “is west of #1 about 400’ and lower in elevation” emerging from bedrock. (SOS 040_004 (Rowe, July 31, 1930)
- Development dewatered “Big Spring” #4 (SOS 044_1, 2, 3)
- Collection facilities at spring show three different inflows to the tunnel (see below)

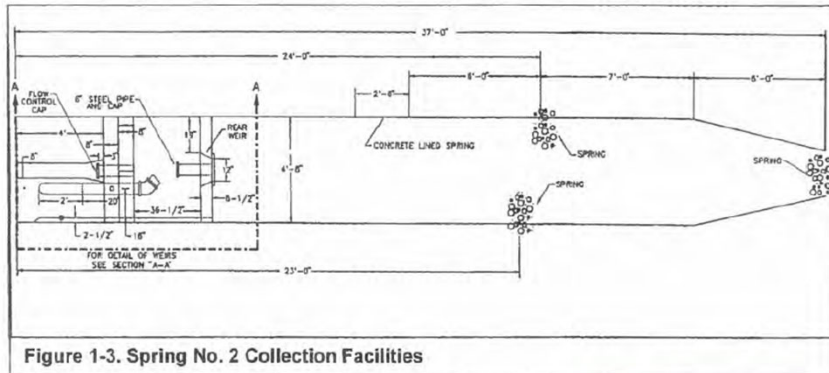


Figure 1-3. Spring No. 2 Collection Facilities

SOS 016_015 (Dames & Moore 2019)



Spring 3

- Prior to development, flowed 15-19 gpm in spring and summer (SOS 040_003, 004,010)
- Rowe referenced Spring 3 flowing in a stream (SOS 040_005)
- From atop bed rock at head of farthest west and [illegible] of Strawberry Creek" (SOS 040_004 (July 31, 1930)
- Developed in 1933 (FR 153 (ETW, 1976))



Spring 4

- Spring # 4 was a large natural spring that was destroyed during development. Rowe originally referred to it as the "Big Spring." (SOS 040_005)
- The water that fed Spring #4 was almost totally diverted by development of Spring #2. (FR 153_006)
- The streamflow at the confluence of 1,2, 3, and 4 was 170 gpm on July 3, 1930 before diversion (SOS 040_006) and dropped to 20 gpm by October 1930 (SOS 044_1) after development of Spring 2.



Weir 1 (below confluence of 1,2,3,4)

- Rowe observed an area lined with riparian vegetation: alders, willows, ferns in 1930 (SOS 040_006; 051_001). In fact, from Weir 1 to station 86, a distance of 3,500 feet Rowe reported “heavy alder growth” (SOS 055_17) which is not true today
- After development of Spring 2, flows fell to 2-3 miners inches in August/September 1930. When Spring 2 turned back in, flows jumped to 10-11 miner’s inches. (SOS 055-016)
- As much as 19.8 gpm on September 29, 1930 (SOS 051_005-012)



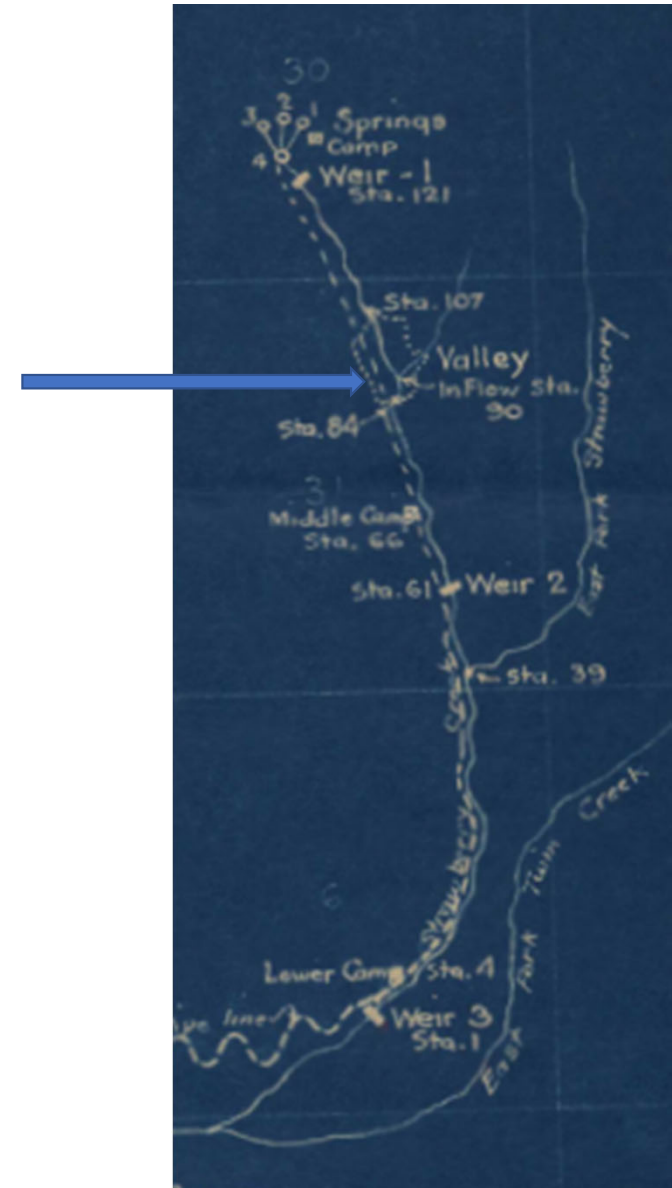
Springs 7

- Spring 7 was added to 2, 3, and 4 in 1934. (FR 153_5 (ETW, 1976))
- It was originally developed as a tunnel (SOS 277_027)
- When the newer drilled 7A, 7B, and 7C were shut in, flow returned to the old tunnel—eventually at 19.4 gpm on July 29, 1985 (SOS 277_055)



Springs 10, 11, 12

- Flows in Creek were augmented by inflow from Springs (10, 11, and 12) at the Cienega. (SOS 51-001, paragraph 3.)
- Boreholes 10 and 11 drilled in 1979, and 12 in 1981 (SOS 277_060)



Station #64

"Measured total flow of Strawberry Creek below camp #2. Bedrock on both sides. Alders cover area about 75' wide-[illegible].

2 pipes together 5 gals 2.1 secs.

Separate: 5 gals in 4.0 $Q = 15.9$

5 gals in 4.4"

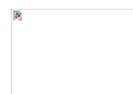
SOS 040_007

Rowe, July 3, 1930



Weir 3, Station #0.0

- Location of the “hotel pickup”
- Hotel diversion was built in 1929 (SOS 051_001 (last paragraph))



BTB's predecessors were not collecting water in Strawberry Canyon prior to 1930

“BTB and its predecessors-in-interest have collected water within Strawberry Canyon for more than 120 years.” –Nichols (BTB-7 (paragraph 12))

Opinion: For the Arrowhead Hotel to source water by gravity feed from Strawberry Canyon would have required crossing over Cold Creek; sourcing from East Twin Creek would have required pumping. There is no evidence of either.

Evidence

1. Lack of any mention in historical record of a pipeline or pumping system, including by Rowe
2. No FS permit prior to 1930
3. No written or physical evidence of a pump or pipe over Cold Canyon (see next slide)

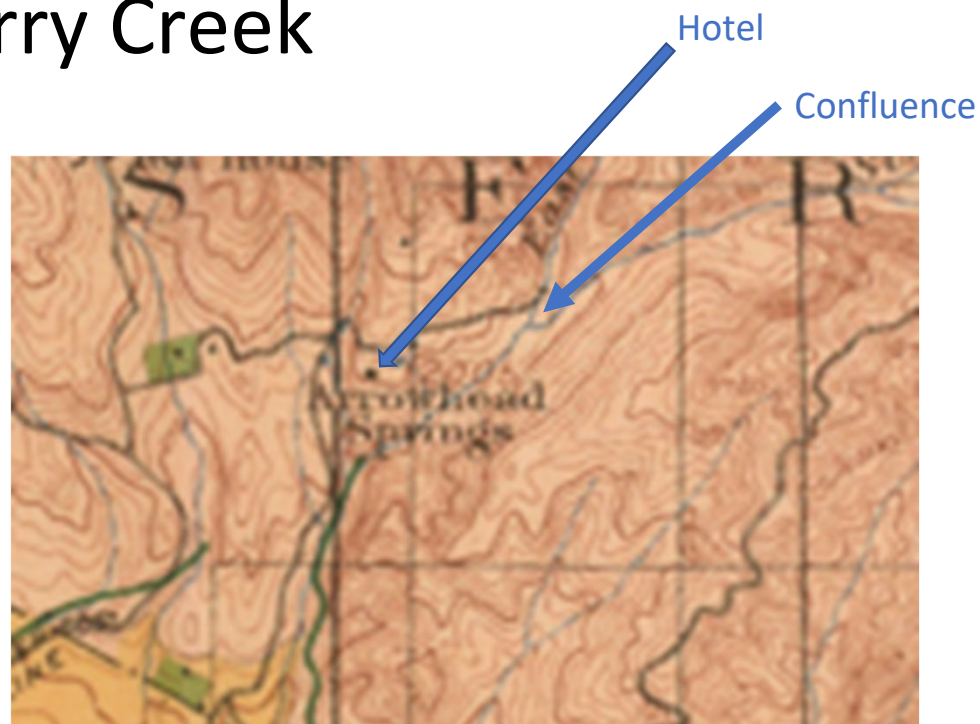
Arrowhead Springs Hotel is at a higher elevation than the confluence of Cold Water Creek and Strawberry Creek

Before 1929, the hotel and bottling works water was stored in a reservoir north (higher elevation) than the hotel. Even the hotel was at a higher elevation than the confluence of Strawberry and Cold Creek. So, to supply the water supply reservoir before the construction contracted in 1929, either a long pipeline crossing over Cold Creek would have been required, or a pump. Neither is mentioned in any record I have reviewed.

Agua Fria. (Cold Canyon)

The Agua Fria (Cold Water) is the water of Cold Canyon, at the head of the pipe line leading to the main reservoir on the high mesa north of the hotel. The elevation of the pipe head is about 2750 feet, or 750 feet higher than the hotel. The water comes from the granite rocks and is clear, sweet and palatable and wholly uncontaminated by organic or other matter. Its mineral contents are exceptionally light, making it practically as pure as distilled water, for reasons stated elsewhere.

FR 43_028-029
G.E. Bailly (year)



Source: SOS 91
1905 Topo Map

Conversions

1 miner's Inch = 9 gallons per minute (Southern California)

1,440 gallons per day = 1 gallon per minute

1.61 acre feet per year = 1 gallon per minute